

vacuoles varied in size, position and amount of particulate material inside. For the purpose of interpreting field data, digestive tubule appearance was categorized into three types. The first type, designated as type A, were tubules that had digestive cells devoid of observable excretory vacuoles under light microscopy. Type B were tubules that digestive cells had vacuoles of small size located in a proximal position with or without particulate matter inside. Type C tubules had cells with large vacuoles in a central or distal position with particulate matter. Percent of bivalves with type A, B or C tubule type within each hourly field sample ($n=20$) taken three times between September 1984 and August 1985 was used to determine possible rhythms of intracellular digestion. Evidence suggests that feeding and digestion in the bivalve, although continuous, is modified by light intensity. Bivalves with highly vacuolated digestive cells were dominant during daytime in September. In June and December samples however, no clear dominance of any of the three tubule types was found for the 24-hour period.

FUNCTIONAL MORPHOLOGY OF THE MANTLE OF NORTH AMERICAN CORBICULACEA. G.L. Mackie, Department of Zoology, University of Guelph, Ontario, Canada.

The mantle edges of twenty-one species of freshwater Corbiculacea were examined for differences in morphologies of mantle folds to determine their taxonomic value and functional significance. The only apparent familial feature is the presence of three distinct distal folds in the mantle edge of Corbiculidae and two in Pisidiidae. Within the Pisidiidae the relative lengths of the middle and outer mantle folds and the presence or absence of cilia and the extent of ciliation on the inner fold appear to be of taxonomic value at the species level. The cilia probably help to circulate water in the mantle cavity, especially in species characteristic of standing waters.

ASPECTS OF COMPARATIVE EMBRYOGENESIS IN THE PISIDIIDAE AND THE CORBICULIDAE (BIVALVIA: CORBICULACEA). Louise Russert-Kraemer, Marvin L. Galloway and Mark E. Gordon, University of Arkansas, Fayetteville.

Microscopical serial sections and freeze-cracked SEM sections were prepared and examined to work out aspects of the comparative embryology of *Corbicula fluminea*, *Sphaerium striatinum* and *Pisidium casertanum*, and to investigate events of developmental "timing" in representative species of corbiculid and pisidiid bivalves. Earlier evidence of heterochrony in *C. fluminea* (Kraemer and Galloway, 1984) was confirmed. Retention of trochophore, pediveliger, veliger, early straight-hinged juvenile and late straight-hinged juvenile stages in *C. fluminea* within the marsupial gill, contrasts strongly, for example, with their suppression in *S. striatinum*. In *S. striatinum* freeze-cracked SEM clearly reveals that developmental stages are compressed from gastrula to juvenile; that the juvenile is retained and attached by its placental byssus to the marsupial gill wall, until it attains a size and degree of tissue differentiation very closely approximating that of the parent. SEM confirms an observation made

earlier by Mackie, that the "placenta" is *not* a "placenta." It is exclusively a connective tissue outgrowth of the embryonic foot which constitutes a broad, strong, non-vascular holdfast attachment to the marsupial gill wall. It appears that production of the byssal holdfast and its attachment constitute the critical embryonic events for pisidiid bivalves, which allow them to veer away from the more marine/estuarine bivalve-like developmental timing preserved in the embryogenesis of *C. fluminea*.

SPAWNING PERIODICITY OF THE ASIATIC CLAM, CORBICULA FLUMINEA, IN THE NEW RIVER, VIRGINIA. F. G. Doherty, D. S. Cherry and J. Cairns, Jr., Department of Biology and University Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg.

Three approaches were utilized weekly to assess the spawning periodicity of the Asiatic clam, *Corbicula fluminea*, in a flow regulated reach of the New River, Virginia, for the duration of the 1984 reproductive season. Data were collected on the number of newly recruited larvae in the New River sediment, number and life stage of larvae naturally released from adults held in a laboratory invertebrate culture device, and the degree to which adult brood chambers were charged with developing larvae for which indices were calculated. Periodicity and relative intensity of spawning effort as determined by each approach were generally compatible. These comparisons reveal three major peaks in spawning activity occurring in June to early July, late August, and early October, each from 2 to 6 weeks duration.

Larval sediment concentrations (number per meter²) peaked seasonally at 16,000, 18,000, 14,000, and 18,000 for the collection days of June 12, July 17, September 4, and October 2, respectively. Larval releases from laboratory held adults peaked seasonally with 1,900 and 1,800 larvae counted per adult for the weeks of June 26 and July 10, respectively, 1,050 for the week of August 21, and 1,275 for the week of October 2. Seasonal peaks in brooding indices occurred for the weeks of July 10 and October 2 with values of 3.5 and 2.7 (of a maximal value of 4.0), respectively. Midsummer index values never exceeded 1.8 (August 7 and 21, September 4). Spring and fall spawns coincided with rapidly rising and falling water temperatures, respectively. Mid-summer spawn occurred during a period when temperatures were relatively stable and never exceeded 26.1 C. These observations do not coincide with previously reported patterns of reproductive efforts by *C. fluminea*, suggesting that reproductive activity and spawning may be highly site specific.

UNIQUE SHELL MICROSTRUCTURE OF CORBICULA FLUMINEA. Robert S. Prezant and Antonieto Tan Tlu, Department of Biological Sciences, University of Southern Mississippi, Hattiesburg.

The internal shell edge (beneath the periostacal infolding) of the Asiatic bivalve *Corbicula* c.f. *fluminea* Müller frequently shows a unique spiral form of crossed-lamellar microstructure. Most populations we have examined from Mississippi show conical blocks of spirally arranged lathes that